Psychological factors and self-care behaviors as correlates of Medication Adherence among Insulin-taking Type 2 Diabetes patients

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Abstract:- Although poor medication adherence (MA) is common in type 2 diabetes mellitus (T2DM) patients, little is known about psychological factors associated with this problem. In this context, we examined the relationship between MA and psychological factors namely depression (Becks Depression Inventory), diabetes related distress (Problem Areas in Diabetes scale), spiritual well-being (Spiritual Well-being Scale) and self-care behaviors (diet, physical activity) (Self Care Inventory). 172 insulin-naive T2DM patients were taken as sample of the study. Pearson's Product Moment Correlation, Multiple Regression Analysis and T-test were used to analyze the data. Although MA was significantly correlated with depression, diabetes related distress, spiritual well-being and self-care behaviors (diet, physical activity). But among them only diabetes related distress and self care behaviours (diet, physical activity) significantly predicted MA. Depressive symptoms were found to be high in female patients and physical activity was found to be high in male patients. This research identified some psychological factors that influenced the medication adherence of adults with type 2 diabetes mellitus. Understanding of the self-care behaviour patterns of diabetic adults may assist primary care providers and educators to develop more individualized treatment plans throughout the course of the illness. Furthermore, recognizing and addressing individual emotional responses (depression and diabetes distress) to diabetes, in addition to providing medical care, may improve the patient's self-efficacy and ability to manage their diabetes. This is important for clinical practice, where optimal management of diabetes requires effort from healthcare providers working collaboratively with the patient. In addition, knowing about the individual's state of spiritual well-being will help health care professionals to frame their actions towards developing intervention techniques which will in turn help them to develop positivity among the chronically ill patients towards their lives.

Keywords: *Depression, Diabetes related distress, Spiritual well-being, Self-care behaviors and Medication adherence.*

I. INTRODUCTION

Diabetes Mellitus (DM) has emerged as a major health care problem in India [1]. Prevalence of diabetes mellitus in India varies from 5.6% in rural areas to 12.1% in major cities [2] [3]. It has been projected that the greatest absolute increase which will occur in number of people with diabetes will be in India [4]. Due to sheer numbers, the economic burden caused by diabetes in India is among the highest in the world. The real burden of the disease is mostly caused by its micro and macro-vascular complications, which lead to increased morbidity and mortality [1]. Many other psychosocial factors contribute significantly to this problem, such as inadequate social support, time pressures, stress and health beliefs that are incompatible with the regimen [5] [6] [7]. The risk of these complications can be reduced by maintaining a good glycaemic control and self care which play a major role in the management of DM [8]. Non adherence to medication declines the efficacy of the medication and in turn, the glycaemic control [9]. There is a continuing need to assess the level of adherence to medication/self care activities and the factors which are related to non adherence to medication and self care among diabetics in the local setting [10]. This would facilitate health care professionals to identify subjects with low medication adherence and thereby aid them in planning interventions to improve medication and self care adherence.

II. OBJECTIVES:

1. To assess psychological factors namely depression, diabetes related distress, spiritual well-being, self-care behaviors (diet, physical activity) and medication adherence among insulin-naive type 2 diabetes mellitus patients.

2. To study the relationship between depression, diabetes related distress, spiritual well-being, self-care behaviors (diet, physical activity) and medication adherence among insulin-naive type 2 diabetes mellitus patients.

3. To identify the significant predictors of medication adherence among depression, diabetes related distress, spiritual well-being, self-care behaviors (diet, physical activity) in insulin-naive type 2 diabetes mellitus patients.

III.   METHODSSTUDY POPULATION

The sample of this cross-sectional study consisted of type 2 diabetic patients from an outpatient clinic at Srinagar in Kashmir. By using purposive sampling method, 172 insulin-naive diabetic patients were included in the study. The patients who met the inclusion criteria were selected.

Inclusion and exclusion criteriaThe inclusion criteria were as follows: 1) 20-65 years of age; 2) having type 2 DM; 3) providing informed consents; 4) taking insulin with oral drugs as their medication and 5) having been diagnosed with diabetes for at least six months. Patients with other physical or psychological problems were excluded from the study. Lack of patient's consent to participate in the study was another exclusion criterion.

IV.   STUDY INSTRUMENTS

1) Beck's Depression Inventory (BDI- II): The Beck Depression Inventory Second Edition (BDI-II) [11] is a 21-item self-report instrument intended to assess the existence and severity of symptoms of depression. The test items are measured on a Likert scale of 0-3. People are asked to report feelings consistent with their own over the past 2 weeks. Each of the 21 items corresponding to a symptom of depression is summed to give a single score for the BDI-II. Interpretation of scores is accomplished through criterion-referenced procedures utilizing the following interpretive ranges: 0-13-minimal depression; 14-19-mild depression; 20-28-moderate depression; and 29-63-severe depression. The BDI-II is positively correlated with the Hamilton Depression Rating Scale with a Pearson r of 0.71, showing good agreement. The test was also shown to have a high one-week test–retest reliability (Pearson r =0.93). The test also has high internal consistency (α=.91).

2) Problem areas in diabetes scale (PAID): The PAID scale developed by Joslin Diabetes Centre, Boston is a measure of diabetes specific emotional distress. Its authors are Polonsky, Anderson, Lohrer, Welch, Jacobson, Aponte, & Schwartz, 1995 [12]. This self-administered questionnaire consists of 20 items that cover a range of emotional problems frequently reported in type 1 and type 2 diabetes. Each item is rated on a six-point Likert type scale, ("Not a problem" to "Serious Problem") reflecting the degree to which the item is perceived as currently problematic. A total scale score is computed by summing the total item responses. Psychometric reports to date on the PAID have shown it to: (i) have consistently high internal reliability (i.e. a = 0.90); (ii) have sound (r = 0.83) 2-month test–retest reliability using a sample of stable patients.

3) Spiritual Well-Being Scale: The first tool used to gather information for the present study was Spiritual Well-Being Scale (SWB) developed by Paloutzian and Ellison, 1982 [13]. The Spiritual Well-being Scale consists of 20 items and includes following two subscales:-Religious Well-being (RWB) and Existential Well-being (EWB). Responses are in a Likert scale with 6 choices (strongly disagree to strongly agree). In positive items, "strongly disagree" receives 1 and "strongly agree" receives 6. While as in negative items, "strongly disagree" receives 6 and "strongly agree" receives 1. Cronbach's alpha coefficients reflecting internal consistency were 0.89 (SWB), 0.87 (RWB) and 0.78 (EWB). The test-retest reliability coefficients were 0.93 (SWB), 0.96 (RWB) and 0.86 (EWB). These are consistent with high reliability and internal consistency.

4) Self Care Inventory: The Self-Care Inventory (SCI), a 14-item self-report measure, was developed by La Greca and colleagues (1992) [14] to assess patients' perceptions of the degree to which they adhere to treatment recommendations for their diabetes self-care. Only two subscales for diet and physical exercise were included in the study. Respondents rate their own self-care on a 5-point Likert scale to reflect how well they followed recommendations during the past month (i.e. from "never" (scored as 1) to "always" (scored as 5). For scoring, items are averaged and converted to a 0-100 point scale, with higher scores indicating higher levels of self-care. Internal consistencies for the SCI items have been reported to be .80 or higher in several studies.

5) Morisky 8 Item Medication Adherence Scale: The Morisky 8-Item Medication Adherence Scale (MMAS-8) developed by Morisky (1986) [15] is a self-report measure of medication-taking behaviour. It addresses barriers to medication-taking with intentional (four items) and unintentional (four items). Respondents rate their medication adherence on a two point Likert type scale. Low scores indicate high medication adherence. The internal consistency (Cronbach's alpha reliability) of 8 item medication adherence scale was found to be 0.83. The current 8-item scale was significantly correlated with the previously validated 4-item self-reported

medication-taking scale (Pearson correlation, 0.64; *P*<.05).. Sensitivity and specificity of this scale was found to be 93% and 53% respectively and also proved to be reliable with good concurrent and predictive validity.

Apart from the above mentioned scales, the biographical information blank was also designed to collect information from the sample group with respect to demographic variables.

Procedure:

In the present study purposive sampling was used. Type 2 diabetic patients were approached personally at a private clinic in Srinagar city of Jammu and Kashmir. Informed consent was taken from these patients in order to seek their voluntary participation and necessary instructions were given. Only those patients were included who agreed to take part in study.

Statistical Analysis:

In this proposed study central tendencies (Mean and Standard Deviation), Pearson's correlation coefficient, multiple regression analysis and t-test were used

V. RESULTS AND INTERPRETATION

Table 1: *Showing frequency distribution of type 2 diabetic adults on depression.*

Levels of Depression	Type 2 diabetic mellitus patients							
	Low		*Mild*		*Moderate*		*Severe*	
	Frequency	*%*	*Frequency*	*%*	*Frequency*	*%*	*Frequency*	*%*
	107 62.20		36	20.93	22	12.80	7	4.06

Table 1 reveals that 62.20% of the insulin-naive type 2 diabetic mellitus patients fall in the minimal level of depression, 20.93% of them fall in the mild level of depression, 12.80% fall in the moderate level of depression and the remaining 4.07% of them fall in the severe level of depression.

Table 2: *Showing frequency distribution of type 2 diabetes mellitus patients on diabetes related distress.*

Levels of Diabetes related distress	Type 2 diabetic mellitus patients		
	Low	*Moderate*	*High*
	Frequency %	*Frequency %*	*Frequency %*
	142 82.56	30 17.44	0 0

Table 2 reveals that 82.56% of the insulin-naive type 2 diabetic mellitus patients fall in the low level of emotional distress, 17.44% of them fall in the moderate level of emotional distress and the 0% of them fall in the high level of emotional distress.

Table 3: *Showing frequency distribution of type 2 diabetes mellitus patients on spirituality well-being.*

Levels of Spirituality well-being	Type 2 diabetic mellitus patients		
	Low	*Moderate*	*High*
	Frequency %	*Frequency %*	*Frequency %*
	0 0	26 15.11	146 84.89

Table 3 reveals that 0% of the insulin-naive type 2 diabetic mellitus patients fall in the low level of spiritual well-being, 15.11% of them fall in the moderate level of spiritual well-being and the remaining 84.89% of them fall in the high level of spiritual well-being.

Table 4: *Showing frequency distribution of type 2 diabetes mellitus patients on self-care practices (Diet and Physical activity).*

Levels of Self-care practice (Diet)	Type 2 diabetic mellitus patients		
	Low	*Moderate*	*High*
	Frequency %	*Frequency %*	*Frequency %*
	0 0	40 23.26	132 76.74
Levels of Self-care practice	*Low*	*Moderate*	*High*

(Physical activity)	*Frequency %*	*Frequency %*	*Frequency %*
	27	91	54
	15.70	52.90	31.40

Table 4 reveals that 0% of the insulin-naive type 2 diabetic mellitus patients fall in the low level of diet, 23.26% of them fall in the moderate level of diet and the 76.74% of them fall in the high level of diet.

Table 4 also reveals that 15.70% of the insulin-naive type 2 diabetic mellitus patients fall in the low level of physical activity, 52.90% of them fall in the moderate level of physical activity and the 31.40% of them fall in the high level of physical activity.

Table 5: *Showing frequency distribution of type 2 diabetic adults with respect to Medication Adherence*

Levels of Medication Adherence	Type 2 diabetic mellitus patients		
	Low	*Moderate*	*High*
	Frequency %	*Frequency %*	*Frequency %*
	14	122 70.94	36
	8.13		20.93

Table 5 reveals that 8.13% of the insulin-naive type 2 diabetic mellitus patients fall in the low level of medication adherence, 70.94% of them fall in the moderate level of medication adherence and the 20.93% of them fall in the high level of medication adherence.

Table 6: *Showing correlation between depression, diabetes related distress, spiritual well-being, self-care practices (diet and physical activity) and medication adherence among insulin-naive type 2 diabetes mellitus patients.*

Variables			*Pearson's Coefficient*		
	Depression	Diabetes related distress	Spiritual well-being	self-care practices (Diet)	self-care practices (Physical activity)
Medication adherence	r = 0.499** (p < .0001)	r = 0.551** (p < .0001)	r = -0.420** (p < .0001)	r = -0.433** (p < .0001)	r = -0.332** (p < .0001)

** $p \leq 0.01$ level of significance

Results revealed that there is significant positive correlation between depression, diabetes related distress and poor medication adherence and negative correlation between spiritual well-being, self-care practices (diet and physical activity) and poor medication adherence as correlation coefficients (r = 0.499; r = 0.551; r = -0.420, r = -0.433 and r = -0.332) are significant at $p \leq 0.01$ level of significance.

Table 7: *showing Multiple regression analysis (ANOVA Summary)*

	Sum of Squares	Df	Mean Squares	F
Regression	59.540	5	11.908	
Residual	76.337	166	.460	25.895** (p < .0001)
Total	135.878	171		

a. Predictors: (Constant), Physical activity, Diet, Spiritual well-being, Depression, Diabetes related distress
b. Dependent Variable: Medication adherence

R Square = .438

Table 8: *showing Multiple regression analysis (Summary of Predictor Variables)*

Model	*Unstandardized Coefficients*		*Standardized Coefficients*	*t*
	B	*Std. Error*	*Beta*	
(Constant)	4.360	.998		4.368
Depression	.014	.010	.141	1.486
Diabetes related distress	.019	.007	-.262	2.686**
Spiritual well-being	-.005	007	-.056	-.710
Diet	-.032	.006	-.327	-

				5.357**
Physical activity	-.005	.002	-.174	-2.697**

a. Dependent Variable: Medication adherence   **p≤0.01

       Results also present regression analysis of poor medication adherence and depression, diabetes related distress, spiritual well-being, self-care practices (diet and physical activity). The significance of the F-value (F = 25.895) indicates that certainly there are variables which emerge as significant predictors of poor medication adherence. As R Square value (R = .438) indicates that 43.8% variance in medication adherence is attributed to above selected variables.

       Further results also show the significance of predictors of poor medication adherence. The results reveal that diabetes related distress, (t = -2.686) and self-care practices (diet and physical activity) (t = -5.357; t = -2.697) emerged as significant predictors of poor medication adherence.

       The positive sign of beta value of diabetes related distress indicates that increase in diabetes related distress will lead to increase in poor medication adherence. Further negative sign of self-care practices (diet and physical activity) indicates that increase in self-care practices (diet and physical activity) will lead to decrease in poor medication adherence.

Table 9: *Showing comparison of mean scores of depression, diabetes related distress, spiritual well-being, self-care practices (diet and physical exercise) and medication adherence among insulin-naive type 2 diabetes mellitus patients with respect to their gender.*

Variable	N	Mean	SD	df	t-value
Depression		10.33	7.23		-3.24** (p = .001)
		14.65	9.07		
diabetes related distress		11.53	9.83		-2.06 NS (p = .040)
		15.44	13.13		
spiritual well-being,	Male=64 Female=108	110.64	8.89	170	1.68 NS (p = .093)
		107.96	10.69		
self-care practices (diet)		82.78	8.29		-1.79 NS (p = .074)
		85.32	9.33		
self-care practices (physical activity)		74.42	27.21		3.12** (p = .002)
		60.28	29.51		
Medication adherence		1.14	.833		-.71 NS (p = .478)
		1.24	.926		

** p≤0.01 level of significance; NS=Not Significance

       Results also showed that depression and physical activity differ significantly among insulin-naive type 2 diabetes mellitus patients with respect to their gender as both t-values are insignificant at 0.01 level of significance.

VI.   CONCLUSION AND DISCUSSION:

- Results revealed that there is significant positive correlation between depression, diabetes related distress and poor medication adherence indicating that more the depression and diabetes related distress more will be poor medication adherence. This result is in line with the previous studies which demonstrated that major depression and distress were associated lower adherence to oral hypoglycemic, antihypertensive, and lipid-lowering medications [16] [17].

- Results revealed that there is significant negative correlation between spiritual well-being, self-care practices (diet and physical activity) and poor medication adherence indicating that more the spiritual well-being and self-care practices (diet and physical activity) less will be poor medication adherence. These findings are in accord with the study conducted by Harvey and Cook [18] in which four categories were identified that emerged to suggest the influence of spirituality in behavioural change and disease management: God's involvement in illness management; prayer as a mediator; spirituality as a coping mechanism; and the combination of conventional and spiritual practices. Findings suggest that spirituality played a part in documenting the self-management process.

- Results also revealed that only diabetes related distress and self-care practices (diet and physical activity) emerged as significant predictors of medication adherence. This result was also supported by previous literature in which regression analyses demonstrated that diabetes distress, but not depression severity, was significantly related to medication adherence and predicted future medication adherence [17] [19].

- Results also showed that only depression and physical activity differ significantly among insulin-naive type 2 diabetes mellitus patients with respect to their gender. This finding is consistent with the study done by Blazer, Moody-Ayers, Craft-Morgan, and Burchett [20] or Ortiz, Cabriales, González, and Meza, [21] in which female gender was associated with comorbid depression among older diabetic adults and men were found to practice more exercise than women.

Implications of the study:

This research identified some psychological factors that influenced the medication adherence of insulin-naive type 2 diabetes mellitus patients. Understanding of the self-care practices of diabetic patients may assist primary care providers and educators to develop more individualized treatment plans throughout the course of the illness. Furthermore, recognizing and addressing individual emotional responses (depression and emotional distress) to diabetes, in addition to providing medical care, may improve the patient's self-efficacy and ability to manage their diabetes.

VII.   ACKNOWLEDGMENTS

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